Development of a Decision Model for Strategic Outsourcing

Sharon Ordoobadi
University of Massachusetts-Dartmouth

A phased decision model is developed to provide a tool for decision makers to help them make more informed decision regarding their outsourcing policy. This model regards outsourcing policy as a strategic decision rather than a quick fix. Thus, the strategic soundness of an outsourcing decision is evaluated first, and only if the decision is strategically sound the model will advance to the next phase. The main objective of this research is to link the strategic aspects of outsourcing with the economic aspects into a decision matrix. This decision model consists of three phases: strategic evaluation, economic evaluation, and decision analysis. The final decision will be made by putting together the results of analysis of the first two stages.

INTRODUCTION

The review of the published literature on outsourcing shows that the focus of the research has been on the two main areas: *benefits and risks of outsourcing, and strategic outsourcing.* A brief overview of the works done in these areas follows:

Benefits and risks of outsourcing
Some advantages offered by outsourcing cited in the literature (Chalos, 1995), and (McCarthy, 1996) are:
- Higher level of flexibility, with less restriction from the rules existing in the company.
- Increased responsiveness to customers' needs. Customer feedback can be transferred to suppliers with no need to go through company policy and bureaucracy.
- Providing special services to the customers through outsourcing without the need to hire special skill workers.
- Liability and risk reduction. Outsourcing can reduce many sources of risk and potential liability faced by manufacturers like: safety, EEO, ADA, workers' compensation, etc.
- Reduction of capital investment and labor requirements.
- Lower capital risk.
- Access to the innovations and developments of more specialized suppliers.
- Reduction of cost because of the supplier's economies of scale on raw material, labor, and overhead.
- greater focus of resources on high value-added activities and core business.

Some of the risks associated with outsourcing cited in literature (Friedman,1991), and (Raistrick, 1993) are:

- Lack of control on the quality of the product/service provided by the suppliers.
- Inability to meet fluctuations in demand for the product/service that has been outsourced.
- Loss of control over suppliers. Possibility of suppliers becoming a competitor for the firm themselves or assisting the firm's competitors.
- Negative effect on employees' morale.
- Loss of critical skills or developing the wrong skills.
- Loss of cross-functional skills.

Strategic Outsourcing

The literature on strategic outsourcing can be categorized into three classes: The first class shows the work of scholars who believe strategic outsourcing is possible by identifying factors that have both the short-term and long-term impact on the make/buy decisions. The second category of the literature represents the work of those who believe the main determinant of an outsourcing policy is the type of activity that is being considered for outsourcing. General consent is that core activities should be kept in-house, and only non-core activities are good candidates for outsourcing. The third class of literature on outsourcing deals with various other issues of concern in an outsourcing decision. A brief overview of these three categories follows:

A. Factors affecting outsourcing decisions	Authors
production costs, and transaction costs	(Quinn & Himer, 1994) (Dartina, 1994)
volume, technological uncertainty, firm's experience, frequency of change in product specification, and level of competition in the supplier's market	(Walker & Weber, 1984)
R & D capability, expected life of technology, previous experience of make/buy decisions, degree of competition, and managerial capability	(Kurokawa,1997)
maturity of the technology, competitors' technology position in the market, and significance of the process now and in the future	(Welch & Nayak, 1992) (Venkatesan, 1992)

B. Activity type	Authors
core activities versus none core activities	(Gardiner & Monroe, 1992) (Fagan, 1991) (Belinski & Koehler, 1995)

C. Other issues	Authors
importance of long-term plan for outsourcing	(Gupta & Zhender, 1994)
application of Case- Based Reasoning (CBR) technique	(Mclover & Humphreys, 2000)

use of policy approach as opposed to business approach, and cost-based approach	(Ford, et al, 1993)
guideline for proper implementation of outsourcing	(Lankford & Parsa, 1999)
use of technology matrix for outsourcing	(Probert, et al, 1993)

However, none of the work in the literature has put together all the steps recommended to go about an outsourcing decision. There are many tools available to analyze economic and strategic factors separately. This research attempts to develop a comprehensive model that will combine both categories of factors that lead to a better outsourcing decision. The decision model proposed here, consists of three phases: strategic evaluation, economic evaluation, and decision analysis. In the first phase, the strategic factors such as core competencies, process significance, maturity of the technology and firm's competitive position are evaluated using a decision matrix to determine the category that an activity belongs to. The activities will fall into one of the three categories: outsourced activities, in-house activities, and marginal make/buy activities. If outsourcing determined not to be strategically justified for certain activities, no further analysis is required and those activities stay in-house. Appropriate vendors will be identified for activities that are determined to be good candidates for outsourcing. However, if the result of the first phase is inconclusive, that is, evaluation of strategic factors alone could not determine the best policy, namely outsourcing or in-house production, the model moves to the next phase.

The second phase, economic analysis is applied to marginal make/buy activities. The difference between in-house production costs and outsourcing costs, referred to as delta cost, is calculated. Positive delta cost indicates that outsourcing is a cheaper option. Thus, for marginal buy activities it is both strategically and economically justified to outsource. Negative delta cost indicates that in-house production has cost advantage. Thus, for marginal make activities the conclusion is to keep the activity in-house. For activities that delta cost alone can not conclusively identify the best option, Minimum Attractive Rate of Return (MARR) will be included to come up with the final decision.

Section II provides some background on the importance of outsourcing policies and an overview of the outsourcing model. Detailed explanations of different segments of the model are covered in sections III. An illustrative example is provided in section IV. Section V covers the concluding remarks.

THE IMPORTANCE OF STRATEGIC OUTSOURCING

The value chain in manufacturing companies includes the following activities: research & development, product design, process design, production, marketing, and distribution. Each of these activities has a contribution to the firm's profits and could be a potential candidate for outsourcing. Outsourcing is the practice of buying a product or service that was produced or done in-house from a vendor, or an outside source

When properly understood and managed in the overall strategy, outsourcing can aid in competitiveness. The proper use of outsourcing can reduce costs, improve returns, and help a company focus on its core competencies. However, research has shown that outsourcing is often a major culprit for the continued loss of international competitiveness by western companies.

This can be attributed to the failure to view outsourcing strategically and using it solely as a defensive approach. The mindset is often: reduce costs, improve returns, increase product market share. This leads directly to an emphasis on a financial analysis to be used as a scorecard to keep track of direct costs, overhead, working capital, and returns.

Managers have often used outsourcing as a defensive strategy to try to fix performance problems. What is missing in most outsourcing decisions is a full analysis of the strategic risks of losing core technologies and skills. Outsourcing decisions based solely on an economic analysis may make financial sense at the time, but in the long term, these decisions will eat away the company's core competencies. Outsourcing should be viewed in strategic and offensive roles, and generally should focus on areas far removed from the core competencies.

The main objective of this research is to link the strategic aspects of outsourcing with the economic aspects into a decision matrix. This will allow the managers to make a more informed decision based on both strategic and economic factors. There are many tools available to analyze economic and strategic factors separately. This research attempts to develop a comprehensive model that will combine both categories of factors that lead to a better outsourcing decision.

The steps that are taken to reach the objective are as follows:
- identify the core competencies of a business unit.
- determine if the activity is "right" to outsource with respect to strategic risk factors.
- calculate the economic feasibility of the decision.
- generate a decision matrix combining strategic and economic factors.
- use a Rate of Return (R.O.R) Analysis for investment to evaluate the marginal decisions. These steps are reflected in the three phases of the proposed model; strategic evaluation, economic evaluation, and decision analysis. The detailed description of the model is provided in the next section.

THE OUTSOURCING DECISION MODEL

The outsourcing flowchart of figure 1 displays the sequence of analyses for the model. The first phase, the strategic evaluation consists of a core competency analysis to determine if a component is a core activity, and process significance analysis that takes other important strategic factors like process significance, process maturity, and market competitive position into consideration. The second phase, the economic analysis looks at the economic feasibility of an outsourcing policy. The final phase, the decision analysis combines the output from the strategic evaluation and economic analysis to formulate the best decision for the company. The three phases of the model are described in detail in the following sections.
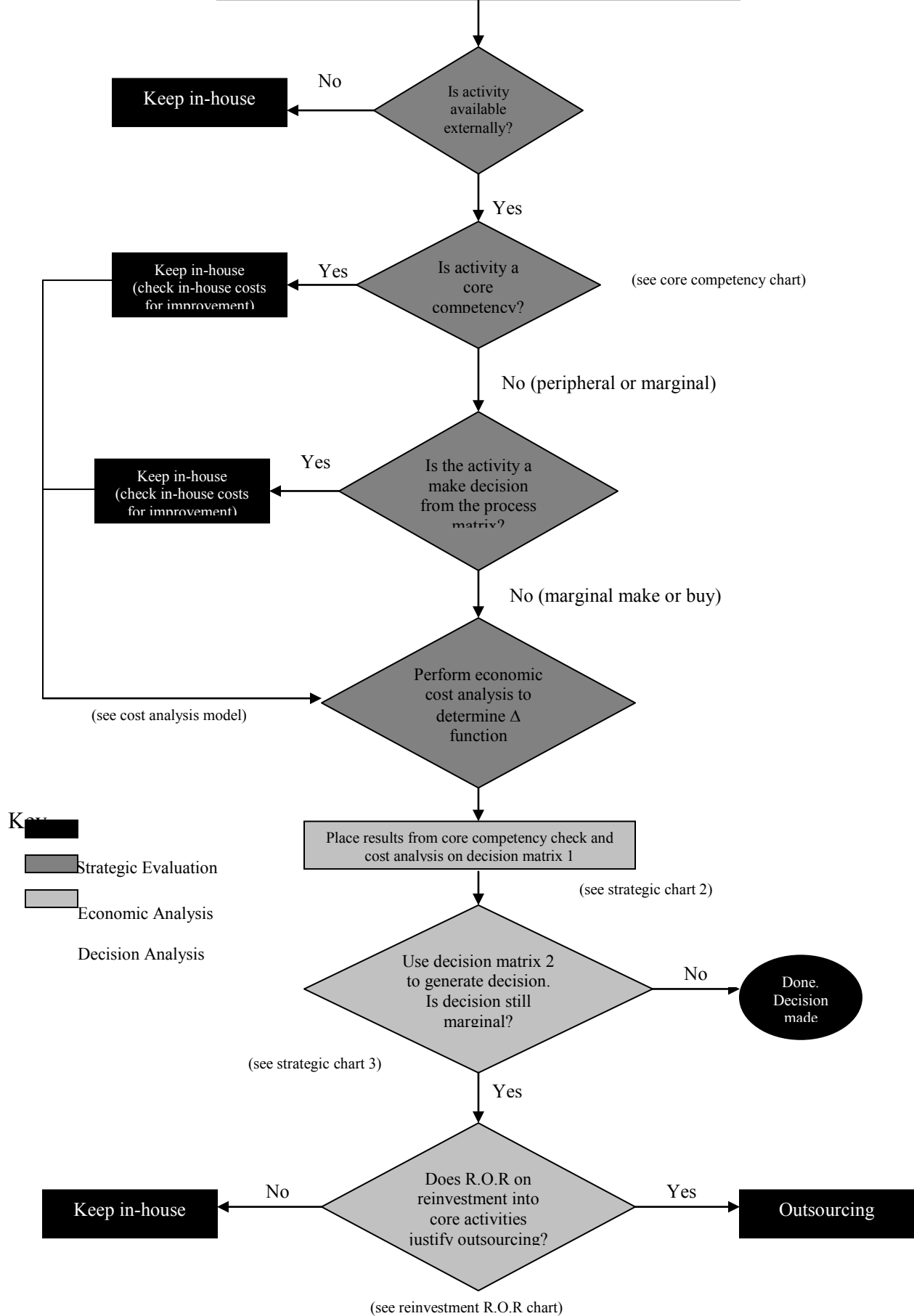
Phase I. Strategic Evaluation
The purpose here is to determine if an activity is a candidate for outsourcing. Two criteria are checked:
- is the activity a core competency of the firm? (core competency check)
- what is the technological position of the firm relative to its competitors? (process significance analysis)

Together, these two analyses cover important strategic factors that are needed for an accurate analysis. The following section describes what "core competencies" mean and how core competencies of a firm are determined.

FIGURE 1   OUTSOURCING DECISION MODEL

Keep in-house

No

Is activity available externally?

Yes

Keep in-house (check in-house costs for improvement)

Yes

Is activity a core competency?

(see core competency chart)

No (peripheral or marginal)

Keep in-house (check in-house costs for improvement)

Yes

Is the activity a make decision from the process matrix?

No (marginal make or buy)

Perform economic cost analysis to determine Δ function

(see cost analysis model)

Key

Strategic Evaluation

Economic Analysis

Decision Analysis

Place results from core competency check and cost analysis on decision matrix 1

(see strategic chart 2)

Use decision matrix 2 to generate decision. Is decision still marginal?

No

Done. Decision made

(see strategic chart 3)

Yes

Keep in-house

No

Does R.O.R on reinvestment into core activities justify outsourcing?

Yes

Outsourcing

(see reinvestment R.O.R chart)

Core Competency Check

C.K. Prahalad and Gary Hamel coined the term "core competencies" in their article *The Core Competence of the Corporation*. The term "core' means key, critical, or fundamental. "competence" is the capability, skill, or ability. Core competencies tend to be a central set of corporate skills involving activities that are based on knowledge and experience rather than assets. Core competencies distinguish a company from its competitors. They are activities that offer long-term competitive advantage and must be invested in, controlled, and protected. Thus, for a firm to keep its competitive advantage, the core activity(ies) should be kept in-house. As a result, the first step in this outsourcing model is to determine if the activity in question is a core competency of the firm. An activity should satisfy several criteria to be categorized as a core competency (Prahalad & Hamel, 1990); (Quinn & Hilmer, 1994).

The core competency check asks a series of questions that are essential to defining a core competency:

- Does activity need highly specialized design and manufacturing skills?
- Does activity have a high impact on what customers perceive as the most important product attributes?
- Does activity provide potential access to a wide variety of possible future markets?
- Is activity difficult for competitors to imitate?

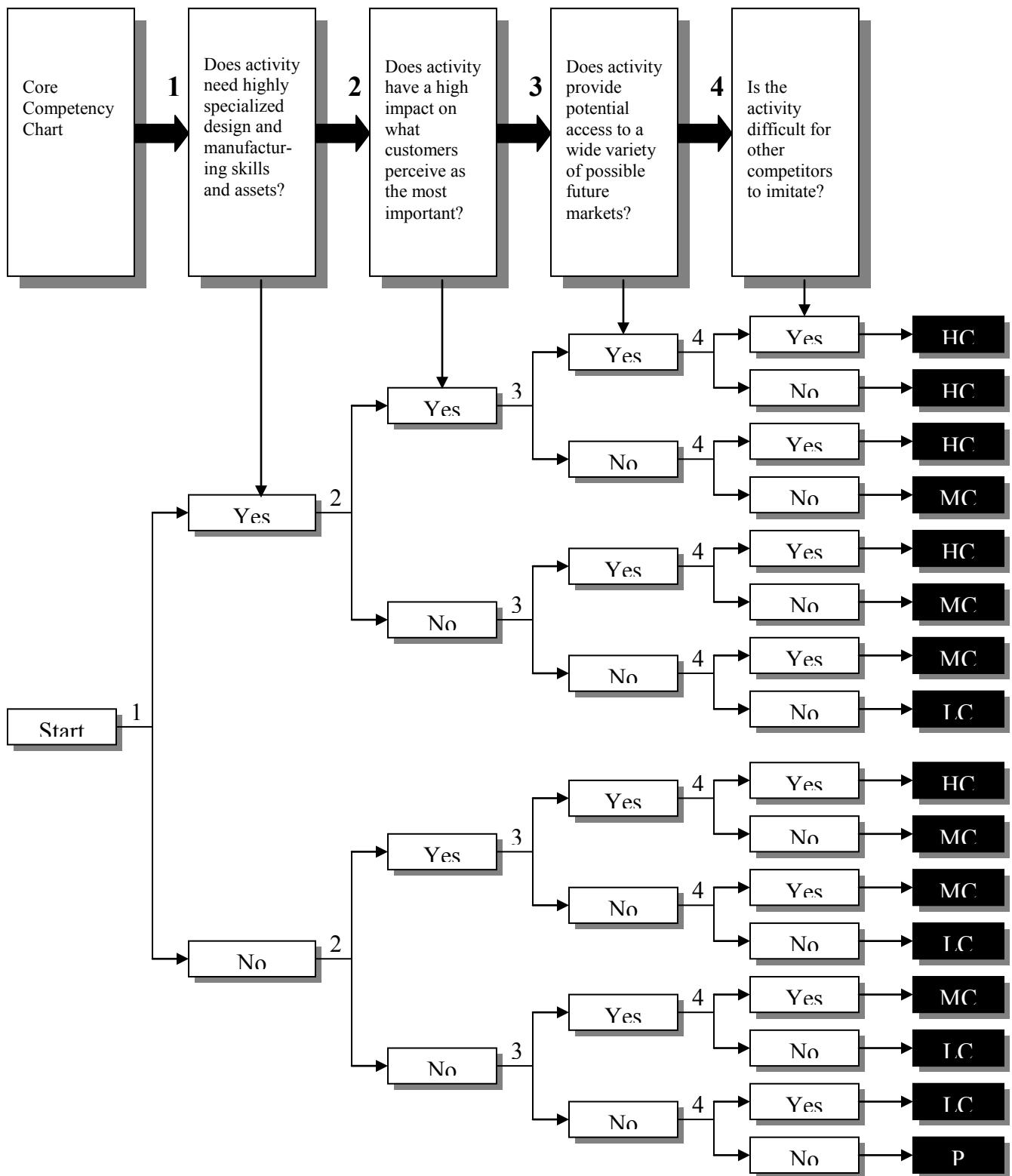The core competency chart check is illustrated in figure 2.

An activity is considered a high core competency (HC) if there are at least three "yes" answers to the questions asked. An activity is considered a medium competency (MC) if there are two "yes" answers. The low ranking is assigned to activities that have no more than one "yes" answer. An activity is considered peripheral if it has no "yes" answer. High core competencies are kept in-house, and no further analysis is needed. Peripheral activities will be outsourced to the appropriate vendor(s). Medium and low competencies are somewhat marginal activities and require more analysis to determine whether they should continue in-house or be outsourced. They will be evaluated further in the process significance analysis.

Process Significance Matrix

The process significance matrix analyzes the strategic risk involved when outsourcing. This matrix is adapted from the Strategic Sourcing Model (SSM) by (Welch and Nayak, 1992). This matrix relates the maturity of technology, significance of technology now and in the future, and how well a company competes with its competitors. The decision maker rates the activity for each of the three attributes and plots the rank on the matrix. This matrix is illustrated in figure 3.
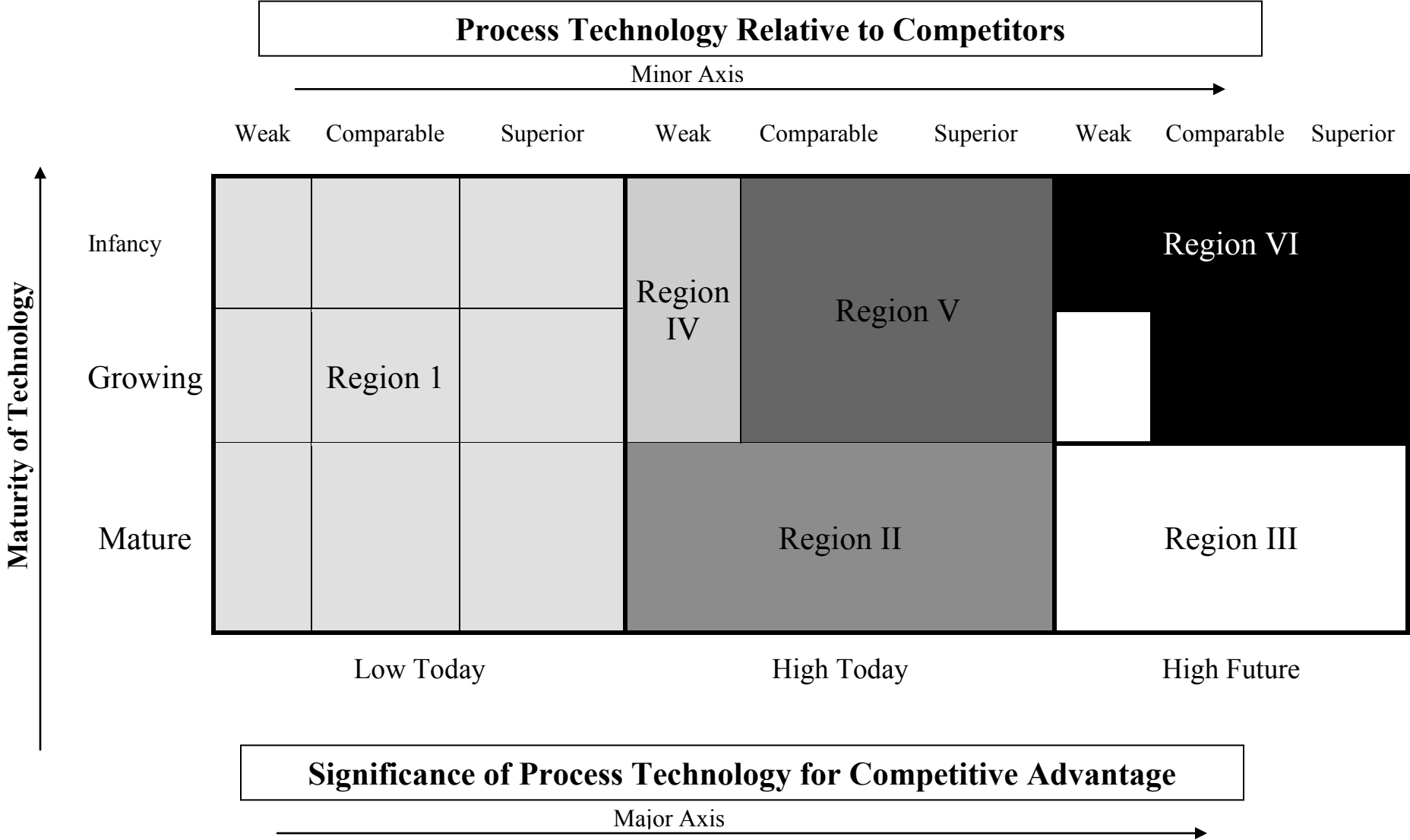
The matrix is divided into six regions. Activities that fall in region I are most likely to be outsourced. Both process significance and competitive advantage are low. Since the significance of the process is low, this activity is a prime candidate to be outsourced regardless of the process maturity or how well the company compares with its competitors. Region II is a marginal buy area. Process significance is high at this time, but technology has been around for a long time and is well known to the competitors. Specialized suppliers may benefit from economies of scale and can do the process cheaper. In region III, process significance is deemed to be high in the future, but the technology is mature or the company is weak in the process relative to the competitors. Suppliers may benefit from economies of scale, or it may cost too much to match the company's competitor level, so developing suppliers may be necessary and advantageous. Region IV is a marginal make area. The process significance is high, and the technology is new

FIGURE 2
CORE COMPETENCY CHART

HC = High Core Competency
MC = Medium Core Competency
LC = Low Core Competency
P = Peripheral

FIGURE 3
PROCESS SIGNIFICANCE MATRIX

Process Technology Relative to Competitors

Minor Axis

	Weak	Comparable	Superior	Weak	Comparable	Superior	Weak	Comparable	Superior
Infancy				Region IV	Region V			Region VI	
Growing		Region 1		Region IV	Region V			Region VI	
Mature					Region II			Region III	

Maturity of Technology

Low Today — High Today — High Future

Significance of Process Technology for Competitive Advantage

Major Axis

or growing. However, company is weak relative to the competitors. In region V, the process significance is high, the technology is new and growing, and the company is comparable or superior relative to the competitors. Thus, activities that fall in this region are kept in-house to maintain company's competitive advantage, no further analysis is required. Region VI recommends internal capabilities be developed. The process significance is high in the future, and the technology is new or growing.

To summarize, the core competency analysis identifies activities that are considered high core activities. These activities will not be outsourced so the company could maintain its competitive advantage. Benchmarking is recommended to pinpoint possible inefficiencies for process improvement purposes. Peripheral activities are good candidates for outsourcing, since they do not have much strategic importance. Low and medium core competency activities are then taken to the next level of analysis, the process significance analysis. The process significance matrix chart adds a multi-dimensional view to the strategic analysis. Activities that fall in regions V and VI of the matrix are activities that will be kept in-house, and activities in region I will be outsourced. Activities in regions II through IV are marginal make or marginal buy activities, for these activities an economic analysis is performed to evaluate the financial implications of make/buy decision.

Phase II. Economic Evaluation

The economic analysis provides the financial numbers that so many managers like to base their decisions on. This helps the decision maker to determine if the activity is economically feasible to outsource. To perform economic analysis, a delta cost function is defined as the difference between the in-house production cost and the cost of outsourcing the activity. A positive delta cost indicates that the in-house cost is greater than the outsourcing cost, thus outsourcing is a better option. A negative delta cost indicates that producing in-house is a better option. To determine the delta cost, the individual cost elements of outsourcing and in-house production should be identified. The individual cost elements that are used in the formulation of the economic analysis segment of the model follows:

In-House Cost Elements:
1. Labor Cost (L$): Cost of the labor needed for manufacturing or to provide service for the activity. The labor cost is made up primarily of operating core employees and salaried employees that are directly assigned to the activity. Other support employees' labor costs are classified as administrative costs and are contained in the overhead costs.
2. Material Cost (M$): Cost of all the materials used in manufacturing or providing service for the activity, including the transportation cost.
3. Capital Cost (C$): Cost of all the equipment, tools, and other assets that are used in manufacturing or providing service for the activity.
4. Overhead Cost (OV$): Overhead cost contains all the utility costs, administrative costs, employee benefits, inventory cost, quality control, and all other costs attributed to the manufacture or service of the activity.
Total Cost $_{(in-house)}$ TC_{in} : Total in-house production cost consists of labor costs, material costs, capital costs, and overhead costs.
$TC_{in-house} = (M\$+L\$) N + C\$ + OV\$$; $\quad$ N= volume of production

Outsourcing Cost Elements:

1. Unit Purchase Price (UPP$): Cost per unit of an item, the contracted cost of an item, or service charged by the vendor.

2. Transportation Cost (TR$): Cost per unit to transport and deliver an item or a service.

3. Administration Cost (A$): All administrative costs associated in dealing with the vendor(s). This includes:

   a) Planning costs-- the costs of finding a suitable vendor or other pre-contract costs.

   b) Contracting and legal costs-- all contracting and legal costs associated with outsourcing the item or service.

   c) Coordinating and communicating costs: costs from administration, travel and other coordinating expenses with the vendor(s) due to design specifications, change in design, and change in demand.

   d) Quality control and/or inventory costs-- if quality control or inventory holdings needed, these costs are covered here.

4. Other Costs (O$): All other costs involved that are attributed to dealing with the vendor(s) in the outsourcing of an activity.

Total cost $_{(outsourced)}$ TC$_{outsource}$: Total outsourced cost is the sum of the purchase price, transportation costs, administrative costs, and other costs.

Cost to the firm when outsourcing N units of the product can be formulated as:

$TC_{outsource} = (UPP\$ + TR\$)N + A\$ + O\$$

Now, Δ costs function can be defined as: $TC_{in\text{-}house} - TC_{outsource}$

   if Δ costs > 0   outsourcing has cost advantage

   if Δ costs < 0   producing in-house has cost advantage
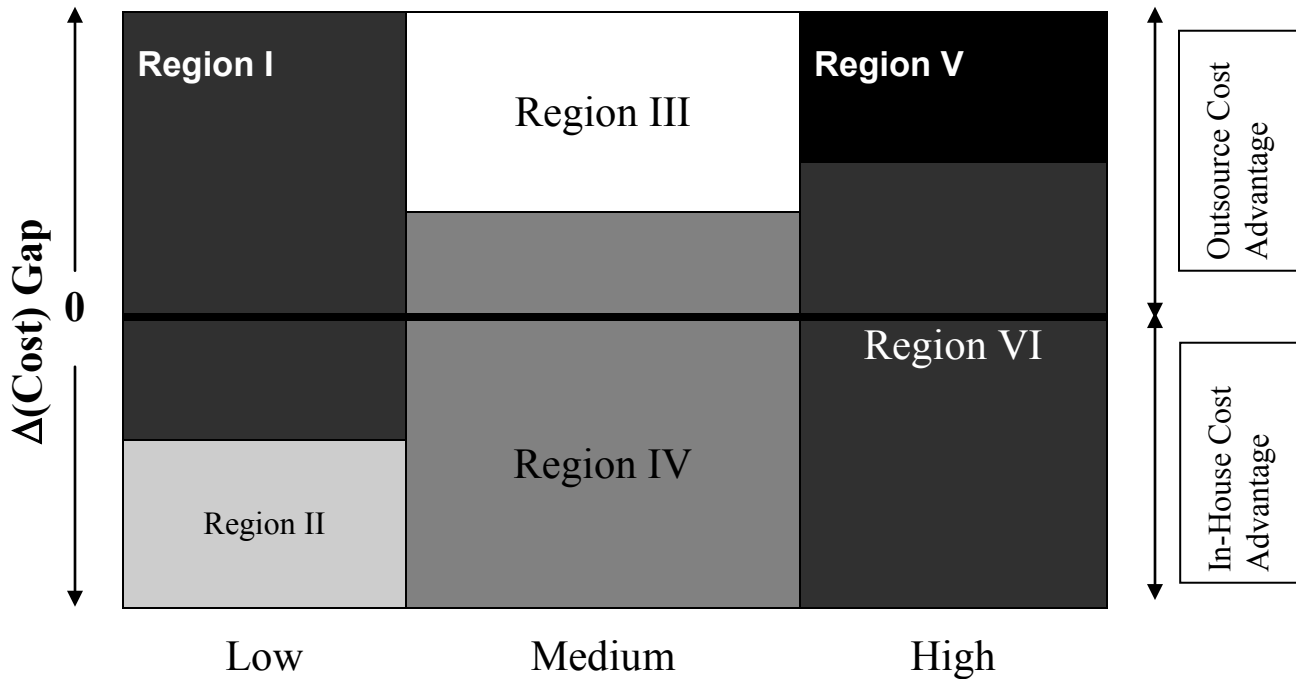
Phase III. Decision Analysis

The purpose of this phase is to combine the outputs from the strategic evaluation and economic evaluation phase to provide a guideline for the managers to make an outsourcing decision. This is done by first, combining the rankings from the core competency check and the delta cost function shown in figure 4, decision matrix 1 (Sunny, 1995). The activities that are low competencies and have positive delta costs or near zero delta costs (region I) will most likely be outsourced, since they are not strategically important and are more economical to purchase from vendors. Activities that fall in regions V and VI will be kept in house, regardless of the value of the delta costs since they are high core activities and strategically too important to outsource. Activities that are low competencies and have negative delta costs fall in region II. Unless the company can do these activities significantly cheaper in-house, outsourcing might still be a better option since these activities are not strategically important to hold on to. Regions III represents medium competency activities that are cheaper to obtain from outside vendors. Activities in region IV are also medium competencies, however, in-house production has cost advantage. Thus, for these two regions the decision is somewhat marginal.

For activities in the regions that do not provide conclusive results, the second part of the strategic analysis namely process significance is added to the analysis. The regions from decision matrix 1 and process significance matrix are combined and shown in figure 5 (decision matrix 2). This matrix grid shows that certain regions provide conclusive results and the manager can use the grid to make a sound outsourcing decision.

However, there are regions that are still marginal (make/buy) even after considering both strategic and economic views. For activities that fall in these regions there is no clear cut decision and further information is needed. For example, say an activity falls in region III from

FIGURE 4
DECISION MATRIX 1

Core Competency vs. Δ(cost) Gap
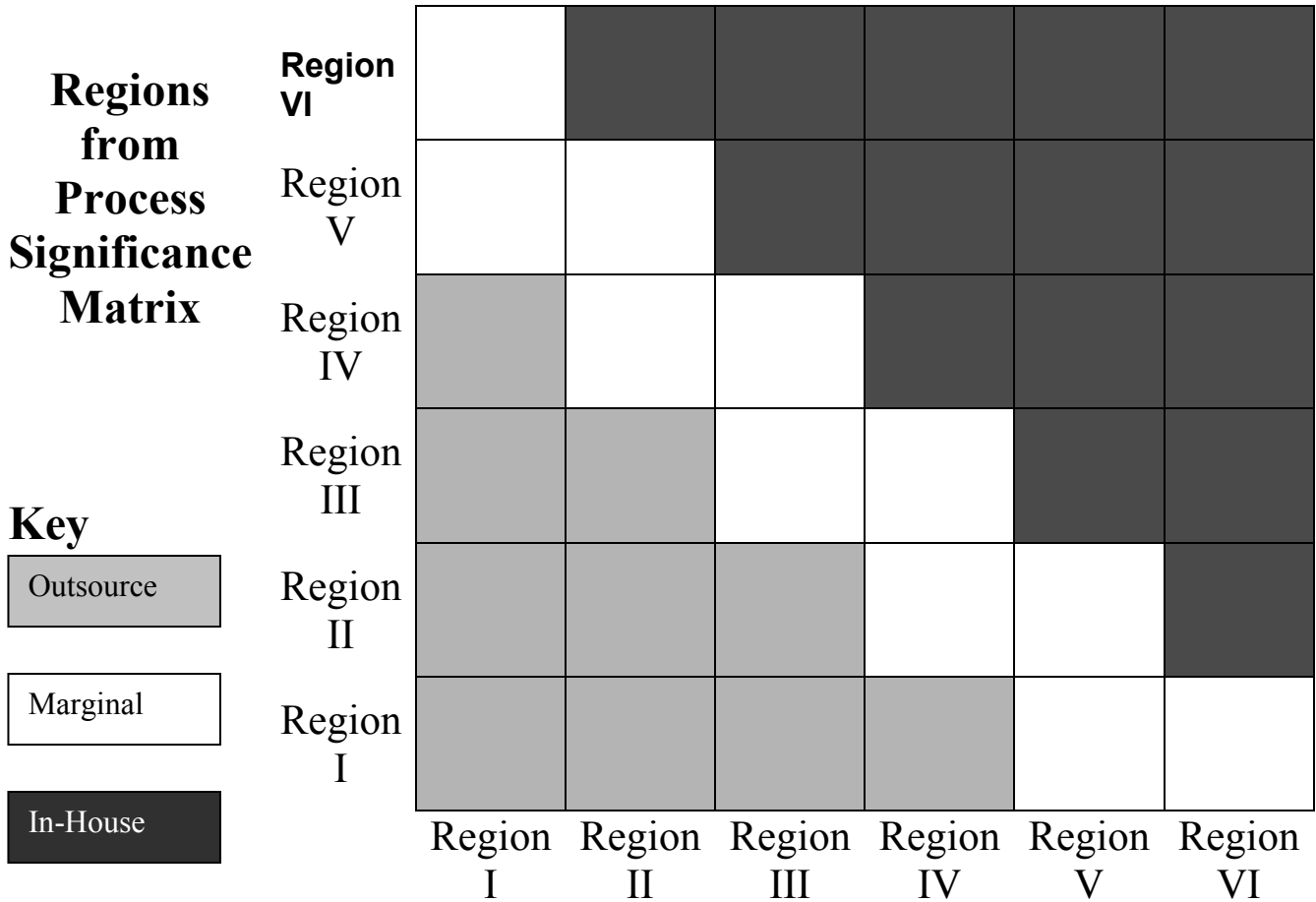

Relative Core Competency

decision matrix 1 and region IV from the process significance matrix. This activity is a medium core competency, and outsourcing has a cost advantage. The significance of the process is high at this time, the technology is new or growing, but the company is not competitive. The company's weakness compared to competitors is a critical element. The company might be wasting time and resources by engaging in an activity in which it is out done by competitors. On the other hand, this activity maybe very important for the future of the company and it would be wise to keep it in-house. Thus, the decision maker needs extra information before making the final decision.

For these marginal decisions, the model guides the decision maker to do the Rate Of Return (R.O.R.) analysis. For example, it may cost the company too much to become competitive, so if reinvestment into other core competencies is advantageous, then it would be strategically and economically beneficial to outsource the activity. If reinvestment into other core activities is not

advantageous, then the company needs to improve itself in this activity by investing heavily into it and become competitive. By becoming more competitive, the company then moves into region

FIGURE 5
DECISION MATRIX 2

Regions from Process Significance Matrix

Regions from Process Significance Matrix	Region I	Region II	Region III	Region IV	Region V	Region VI
Region VI	Marginal	In-House	In-House	In-House	In-House	In-House
Region V	Marginal	Marginal	In-House	In-House	In-House	In-House
Region IV	Outsource	Marginal	Marginal	In-House	In-House	In-House
Region III	Outsource	Outsource	Marginal	Marginal	In-House	In-House
Region II	Outsource	Outsource	Outsource	Marginal	Marginal	In-House
Region I	Outsource	Outsource	Outsource	Outsource	Marginal	Marginal

Key

- Outsource
- Marginal
- In-House

Regions from Decisions Matrix 1

V on the process significance matrix and the in-house region on decision matrix 2. A brief overview of the R.O.R. analysis follows.
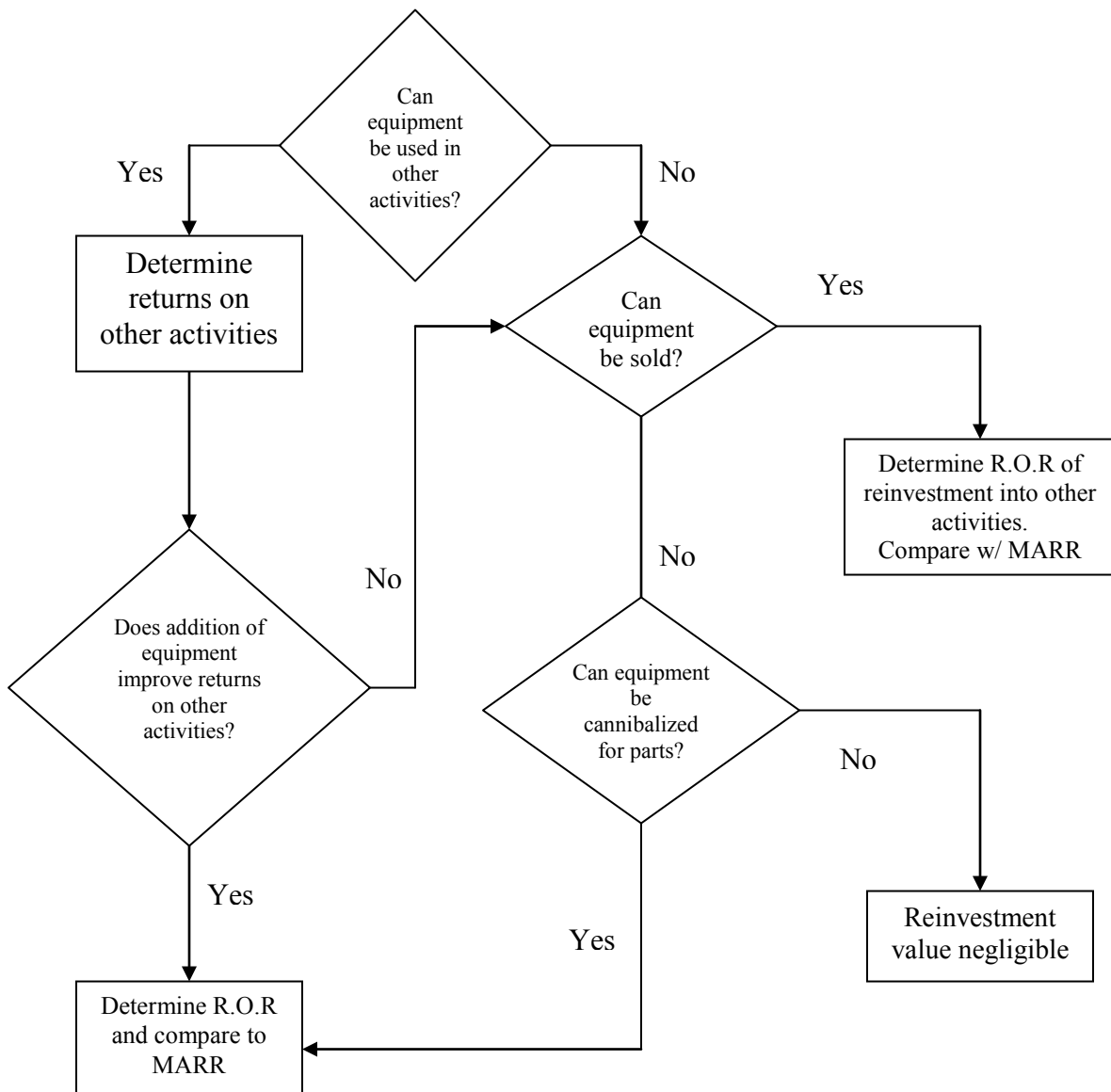
R.O.R. Analysis

R.O.R analysis is used to determine which action provides the best return on investment. For marginal activities, the decision maker have the option of outsourcing and investing more in core activities or investing heavily in the activity and keep it in-house. The purpose of R.O.R analysis is to provide a guideline for the decision maker. The process is shown in the flowchart of figure 6. Minimum attractive rate of return is chosen by the user and rate of return on the investment is compared with this rate to see if the investment is justified.

To illustrate, suppose the decision analysis from decision matrix 2 is marginal, that is economic and strategic evaluations were too marginal to make decisions. Cost analysis

determines that outsourcing is slightly more expensive, and the strategic evaluation is in the marginal make/buy region. One would think to produce in-house, however, outsourcing could free up capital assets. If the extra resource can be reinvested into core activities this might increase the competitiveness and market share. However, to justify this action the rate of return on the investment (R.O.R) should be determined along with the Minimum Attractive rate of Return (MARR), the rate that is acceptable to the investor. The decision criteria will be: if R.O.R > MARR ;   then outsource and reinvest the freed-up resource in core activities. if R.O.R < MARR;   then keep the activity in-house.

FIGURE 6
REINVESTMENT GUIDE FLOWCHART

AN ILLUSTRATIVE EXAMPLE

The following hypothetical example is presented here to show the application of the proposed model. XYZ Company is a widget manufacturing company. Recently, the company is faced with the decision of whether to outsource a certain product. The following steps are taken:

- **Core competency check**; the questions posed to the president of the company along with the answers follows:
  - Does the process need highly specialized manufacturing skills/assets?   No
  - Does the product have a high impact on what customers perceive as the most important attributes?   Yes
  - Is the process difficult for competitors to imitate?   No
  - Does keeping the process in-house provide potential access to a wide variety of possible future markets?   Yes

Based on the above responses, the process to produce this product is considered a medium competency for the company. Thus, further analysis is required.

- **The process significance analysis;** The president now has responded to the additional questions as follows:
  - Is the process technology mature?   Yes
  - Does the company have competitive advantage over its competitors?   No

The process thus, is identified as not significant and a candidate for outsourcing, provided that it is economically justified. Economic justification is done by comparing the in-house production costs with the cost of purchasing the product from a supplier. Both of the above mentioned costs are a function of volume. Per unit in-house production cost (C) is determined by the following cost function:

$C = V + F/N$

where;   V= variable costs (labor + material),   F = fixed costs ,   N= volume of production

The outsourcing cost is available from the supplier. Table 1 shows the price that the supplier charges for different volumes of purchase. Estimated demand for this product is 1250 units. Using the production cost function of the firm,

$C = V + F/N$;   Assume V= \$20 and   F=\$4000

the per unit in-house production cost is determined to be \$23.20. From table 1, supplier delivered price is \$22 per unit for 1250 units. The president concludes that for this volume of production, it is beneficial for the firm to go with the outsourcing decision. The strategic soundness of this decision has already been tested through the core competency check. Thus, this outsourcing decision is both strategically and economically justified.

Of course as the volume of production changes, the result of the economic justification changes as well. Past experience has shown that the actual demand can vary from 10% to 20% of its estimated value. Table 2 shows the result of a sensitivity analysis to see how sensitive the decision is to fluctuations in the demand for the product. The sensitivity analysis is done in the intervals of 10%, 15%, and 20%. As can be seen from table 2, when demand drops by 10% and 15% of its estimated value to 1125 and 1062 units respectively, it is cheaper to produce the component in-house. However, a comprehensive evaluation of an outsourcing decision calls for further investigation.

An outsourcing decision will result in freeing assets that would have been used for the in-house production. This free asset can be reinvested in other activities that are profitable. Thus, before making the final decision it is wise to evaluate this option as well. This can be done by

performing an investment analysis to determine the Rate Of Return (R.O.R) of investing in a core activity of the company. Table 3 shows the result of such an analysis over a period of five years. The Rate of Return is calculated as 18.3%. The Minimum Attractive Rate of Return (MARR) for this firm is set at 16%. Thus, for this scenario, paying more for outsourcing and reinvesting freed money in the company is a sound business decision.

TABLE 1
SUPPLIER DELIVERED PRICE

Supplier Delivered Price Per Unit	Volume of Purchase
$30.00	1-300 units
$28.00	301-600 units
$26.00	601-900 units
$24.00	901-1200 units
$22.00	1201-1500 units
$20.00	1501-1800 units
$18.00	over 1800 units

TABLE 2
SENSITIVITY ANALYSIS RESULT

Units of Demand	Supplier Delivered Price Per Unit	In-house Production Cost Per Unit
1125	$24.00	$23.55
1375	$22.00	$22.90
1062	$24.00	$23.76
1438	$22.00	$22.78
1000	$24.00	$24.00
1500	$22.00	$22.67

TABLE 3
CALUCULATION OF THE RATE OF RETURN

Year	Net Cash Flow
0	$-31,000
1	$10,000
2	$10,000
3	$10,000
4	$10,000
5	$10,000

Rate of Return: 18.39%

CONCLUSIONS

A phased decision model was presented to help the decision makers with their outsourcing decision. The model considers both strategic and economic factors to determine an appropriate policy. This model starts with the strategic evaluation phase to determine if the outsourcing option is strategically justified. Activities that are identified as strategically important to the company stay in-house and no further analysis is needed. Activities that are not strategically important to the company are candidates for outsourcing. Economic evaluation is performed on activities that are marginal make/buy, that is their strategic importance can not be conclusively determined in the strategic evaluation phase of the model. The results of the first two phases of the model are used in the third phase to provide a guideline for making the final decision. This comprehensive model considers variety of factors that greatly impact an outsourcing decision. Thus, a decision maker can use this model to make an informed decision that is in line with the firm's long-term objectives rather than using outsourcing as a quick-fix and a preventive measure.

REFERENCES

Belinski, Daniel S., Koehler, Perry L. (March 95) Outsourcing Offers Non-Traditional Approaches to Managing Mill Costs. Pulp and Paper, vol. 69, No. 3, pp. 105-112.

Bergen, S. A. (1977) The Make or Buy Decision. R & D Management, vol. 8, no. 1,

Bettis, Richard A. & Bradley, Stephen P. (Winter 1993) Outsourcing and Industrial Decline. IEEE Journal of Management Review, vol. 21, No. 4, pp. 85-93.

Bhutta, K.S. and Huq, F. (2002) Supplier selection problem: a comparison of the total cost of ownership and analytic hierarchy process approaches, Supply Chain Management: an international journal, Volume 7, number 3, pp. 126-135.

Chalos, Peter (Winter 1995) Costing, Control, and Strategic Analysis in Outsourcing Decisions. Journal of Cost Management, pp. 31-37.

Dartina, Ralphe (March 1994) The Outsourcing Decision. Management Accounting, pp. 56- 62.

Fagan, Mark L. (March/April 1991) A Guide to Global Sourcing. The Journal of Business Strategy, pp. 21-25.

Ford, D., Cotton, B., Farmer, D., Gross, A., Wilkinson, Ian (1993) Make-or-Buy Decisions and their Implications. Industrial Marketing Management, 22, pp. 207-214.

Friedmann, Rick (October 1991) Outsourcing as a Way to Reduce Major Costs. The Office, pp. 70-72.

Gardiner, A. W. & Monroe, J.J.M. (1994) A New Managerial Approach of Integrated Contracted Services and Outsourcing Non-Core Activities. Society of Petroleum Engineers, pp. 23-29.

Grover, Varun & Teng, T.C. James (November 1993) The Decision to Outsource Information Systems Functions. Journal of Systems Management, pp. 35-38.

Kurokawa, Susumu (May 1997) Make-or-Buy Decisions in R&D: Small Technology Based Firms in the United States and Japan. IEEE Transactions on Engineering Management, vol. 44, no. 2, pp. 124-134.

Lambros G. L. and Socrates J. M. (1997) A Decision Support System for Make or Buy in an Aircraft Maintenance Facility, Production and Inventory Management Journal, fourth quarter, pp. 22- 27.

Lankford, William M. and Parsa, F. (1999) Outsourcing: a primer, Management Decision, 37/4 pp. 310-316

McCarthy E. (1996) To outsource or not to outsource-what's right for you, Pension Management, Vol. 32 No. 4, pp. 12-17

Mclvor, Ronan (2000) A Practical Framework for Understanding the Outsourcing Process, Supply Chain Management: an International Journal, volume 5, number 1, pp. 22-36

Mclover, Ronan, and Humphreys, P.K. (2000), A case based reasoning approach to the make or buy decision, Integrated Manufacturing Systems 11/5 pp. 295-310

Prahalad, C. K. & Hamel, Gary(May-June 1990) The Core Competence of the Corporation. Harvard Business Review, pp. 79-91.

Proberts, D. R.; Jones, S.W. & Gregory, M.J.(1993) The Make or Buy Decision in the Context of Manufacturing Strategy Development. Proc. Ins. Mechanical Engineers Part B: Journal of Engineering Manufacture, Vol. 207, pp. 241-250.

Quinn, J.B. & Hilmer G.F.(Summer 1994) Strategic Outsourcing. Sloan Management Review, pp. 43-55.

Raistrick, Michael (April 1993) Outsourcing and Communications Facilities Management. British Telecommunications Engineering, Vol.12, No. 1, pp. 71-75.

Sunny, Yi (May 1995) Outsourcing Maintenance: Making the Right Decisions for the Right Reasons. Plant Engineering.

Venkatesan, Ravi (November-December 1992) Strategic Outsourcing: To Make or not to Make. Harvard Business Review, pp. 98-107.

Walker, William T.(1993) Outsourcing Without Skipping a Beat.   Annual International Conference Proceedings- American Production and Inventory Control Proceedings of the 36th International Conference, pp. 676-679.

Walker, Gordon, and Weber, David (1984) A Transaction Cost Approach to Make-or-Buy Decisions. Administrative Science Quarterly, no. 29, pp. 373-391.

Welch, James A. &   Nayak, Ranganath (1992) Strategic Sourcing: a Progressive approach to the Make-or-Buy Decision. Academy of Management Executive, Vol. 6, No.1, pp. 23- 31.